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V-पट्टे—औद्योगिक प्रयोजन के लिये निरन्त V-पट्टे

भाग 2 अग्नि प्रतिरोधी और प्रतिस्थैतिक V-पट्टे — विशिष्टि

Indian Standard

V-BELTS — ENDLESS V-BELTS FOR INDUSTRIAL PURPOSES

PART 2 FIRE RESISTANT AND ANTISTATIC V-BELTS — SPECIFICATION

First Reprint JULY 2000

(Incorporating Amendment No. 1)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1993 **Price Group 4**

Pulleys and Belts Sectional Committee, LM 09

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Pulleys and Belts Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

The standard has been split into two parts. This standard (Part 2) covers fire resistant and antistatic endless V-belts for use in coal mines, thermal power plants, etc; where similar hazardous conditions exist. The requirements of general purpose endless V-belts for industrial purposes have been covered in IS 2494 (Part 1) : 1994 'V-belts — Endless V-belts for industrial purposes : Part 1 General purpose — Specification (*second revision*)'.

In preparation of this standard considerable assistance has been derived from BS 3790 : 1981 'Endless wedge belt drives and endless V-belt drives' issused by the British Standards Institution (BSI).

AMENDMENT NO. 1 APRIL 2005
TO
IS 2494 (PART 2) : 1993 V- BELTS — ENDLESS V-BELTS FOR INDUSTRIAL PURPOSES

PART 2 FIRE RESISTANT AND ANTISTATIC V-BELTS — SPECIFICATION

[*Page* 2, *clause* **9.1**(c)] — Substitute the following for the existing:

'The nominal pitch length, and Length Code, if required by the purchaser, otherwise some indication about the matched belts,'

(MGP 29)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 3 SEPTEMBER 2005
TO
IS 2494 (PART 2) : 1993 V-BELTS — ENDLESS V-BELTS FOR INDUSTRIAL PURPOSES

PART 2 FIRE RESISTANT AND ANTISTATIC V-BELTS — SPECIFICATION

[*Amendment No.* 1, *April* 2005] — Substitute 'Amendment No. 2' *for* 'Amendment No. 1'.

(PG 29)

Reprography Unit, BIS, New Delhi, India

Indian Standard

V-BELTS—ENDLESS V-BELTS FOR INDUSTRIAL PURPOSES

PART 2 FIRE RESISTANT AND ANTISTATIC V-BELTS — SPECIFICATION

1 SCOPE

This standard (Part 2) covers the requirements for fire resistant and antistatic V-belts and the methods for determining the fire resistance and electrical surface resistance of V-belts.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
2494 (Part 1) : 1994	V-belts — Endless V-belts for industrial purposes : Part 1 General purpose — Specification (*second revision*)
7923 : 1985	Glossary of terms and definitions relating to drives using V-belts and grooved pulleys (*first revision*)

3 TYPES

3.1 Fire Resistant Antistatic V-belts

Shall meet the requirements given in 7.1 and 7.2.

3.2 Antistatic V-belts

Shall meet the requirements given in 7.2.

4 TERMINOLOGY

In addition to the definitions given in IS 2494 (Part 1) : 1994 and IS 7923 : 1985 the following shall apply.

4.1 Fire Resistant V-belts

Are incapable of propogating fire, when directly exposed to flame and cease to burn and glow after removal of the flame.

4.2 Antistatic V-belts

Are sufficiently conductive to dissipate charges of static electricity which may develop on it in service.

5 REQUIREMENTS

The dimensions and tolerances, pitch length and its variation, transmitting capacities and other requirements not specifically included in this standard shall be as specified in IS 2494 (Part 1) : 1994.

6 SAMPLING

Unless otherwise agreed to between the purchaser and supplier, the sampling plan and criteria for conformity shall be as given in Annex B of IS 2494 (Part 1) : 1994.

7 TESTS

7.1 Fire Resistance Test

Belts shall be deemed to be fire resistant if these comply with the requirements given in Table 1 when tested as per the test method given in Annex A.

Six samples shall be tested. The belt shall be deemed not to be fire resistant if either the average extinguishing time for six test pieces or the extinguishing time for any one test piece exceeds the value given in Table 1.

Table 1 Fire Resistant Requirements

V-Belt Cross Section	Requirements			
	Average Extinguishing Time for Six Test Pieces		Maximum Extinguishing Time for Any One Test Piece	
	Flame Seconds	Glow Seconds	Flame Seconds	Glow Seconds
A	5	5	10	12
B	5	5	10	12
C	5	7	10	15
D	5	7	10	15
E	5	8	10	15

NOTE — This test does not simulate actual service conditions. Its purpose is to assess the suitability of the belt for use in an environment where there is a risk of fire. In this context, the term 'fire resistance' is that which is customarily accepted within the industry.

7.2 Electrical Resistance Test

Belts shall be deemed to be antistatic if electrical resistance on these belts, when measured by the test method given in Annex B, shall not be more than:

$$\frac{5 \times 10^6 \times L}{8l} \text{ ohms}$$

where

L is the distance between the electrodes (mm), and

l is the sum of the lengths of the two sloping sides of the belt (mm)

$$= 2T \sec\left(\frac{A}{2}\right)$$

where

T is the V-belt thickness (mm),

A is the included angle of the V-belt (degree).

NOTE — The electrical resistance shall be measured for at least five different portions of the V-belt, spaced so as to be representative of the whole belt. No individual result shall exceed the maximum specified in this clause.

7.3 Tensile Test

7.3.1 For V-belts of cross section Z, A, B and C the tensile test when carried out in accordance with the method of test given in Annex C of IS 2494 (Part 1) : 1994 shall meet the following requirements:

V-Belt Cross Section	Z	A	B	C
Tensile Strength, N, *Min*	2 100	2 940	4 170	7 850
Elongation, Percent, *Max*	15	15	15	15

7.3.2 For V-belts of cross section D and E, the procedure given in Annex C of IS 2494 (Part 1): 1994 shall be followed except that double the number of samples shall be prepared; and when tensile loads specified below against respective section are applied, the corresponding elongation shall be as follows:

V Belt Cross Section	D		E	
	1	2	1	2
Tensile Load, N	3 000	4 500	4 000	6 000
Elongation, Percent, *Max*	3·5	5·0	3·5	5·0

7.3.3 Tensile test shall be a type test only and it shall be carried out for each belt cross section and not for every belt size.

8 DESIGNATION

8.1 Belts with fire resistance and antistatic properties complying with the requirements of **7.1** and **7.2** shall be designated either with the words 'Fire Resistant and Antistatic' or with the letters 'FRAS'.

8.2 Belts with antistatic properties complying with the requirements of **7.2** shall be designated either with the word 'Antistatic' or with the letters 'AS'.

9 MARKING

9.1 The V-belts shall be marked legibly and durably on the outer non-working face with the following:

a) Symbol 'FRAS' to indicate fire resistance and antistatic characteristic of the V-belt

or

Symbol 'AS' to indicate the antistatic characteristic of the V-belt,

b) Symbol to indicate belt cross section,

c) The nominal pitch length with grading number (length code),

d) Manufacturer's name or trade-mark,

e) The number of this standard, and

f) Month and year of manufacture.

9.2 BIS Certification Marking

Details available with the Bureau of Indian Standards.

10 PACKING

10.1 The belts shall be suitably packed as mutually agreed to between thep urchaser and the supplier.

ANNEX A

(*Clause* 7.1)

TEST FOR FIRE RESISTANCE OF V-BELTS (*FLAME TEST*)

A-1 TEST PIECES

Six test pieces each not less than 100 mm long, shall be cut from the V-belt selected for test. The ends of the test pieces shall be cut cleanly and squarely and be free from ragged ends. The test pieces shall be clean and dry and shall be given no other form of treatment.

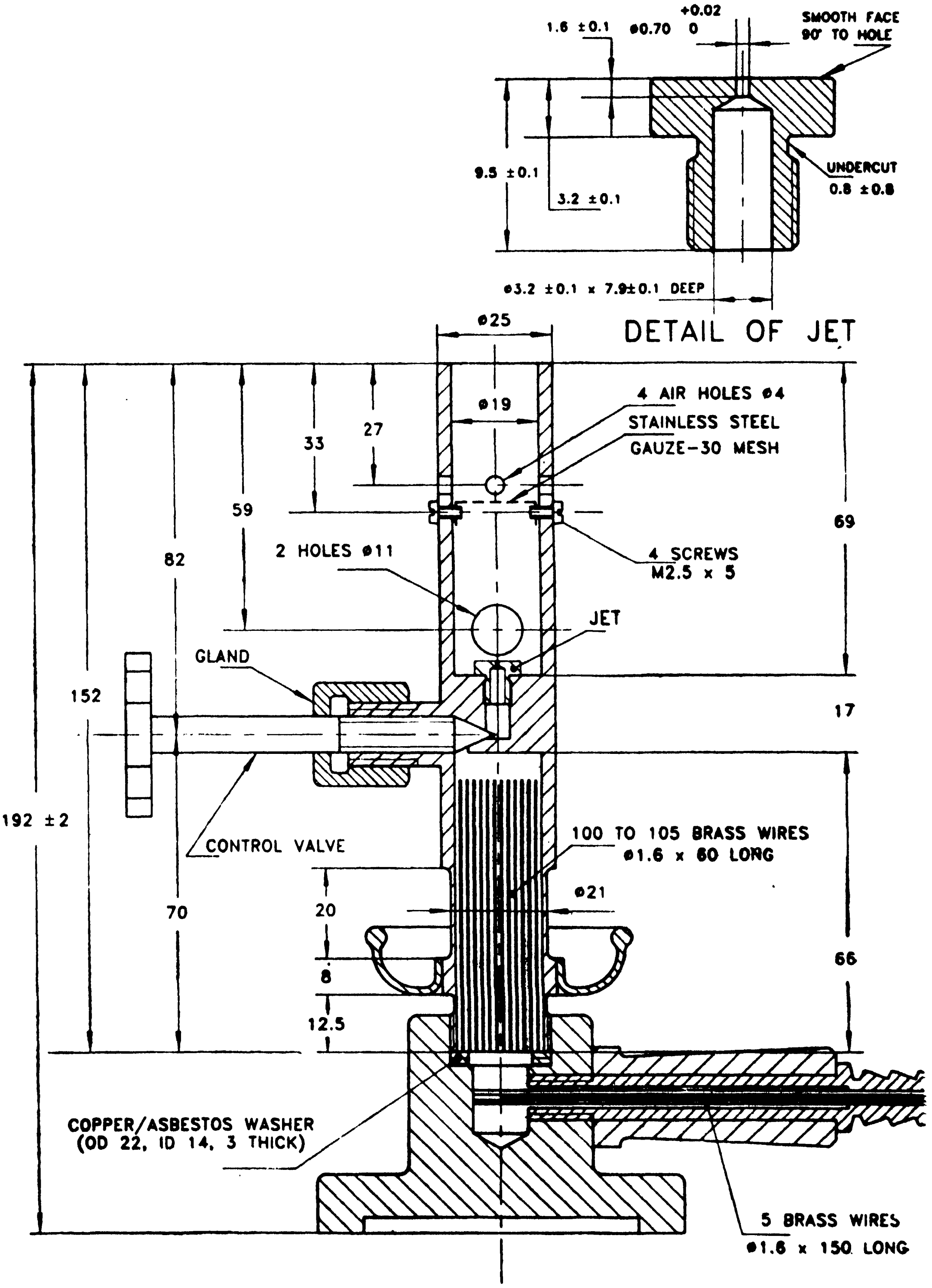
A-2 APPARATUS

The apparatus shall consist of the following:

a) A Barthel type spirit burner (*see* Fig. 1).

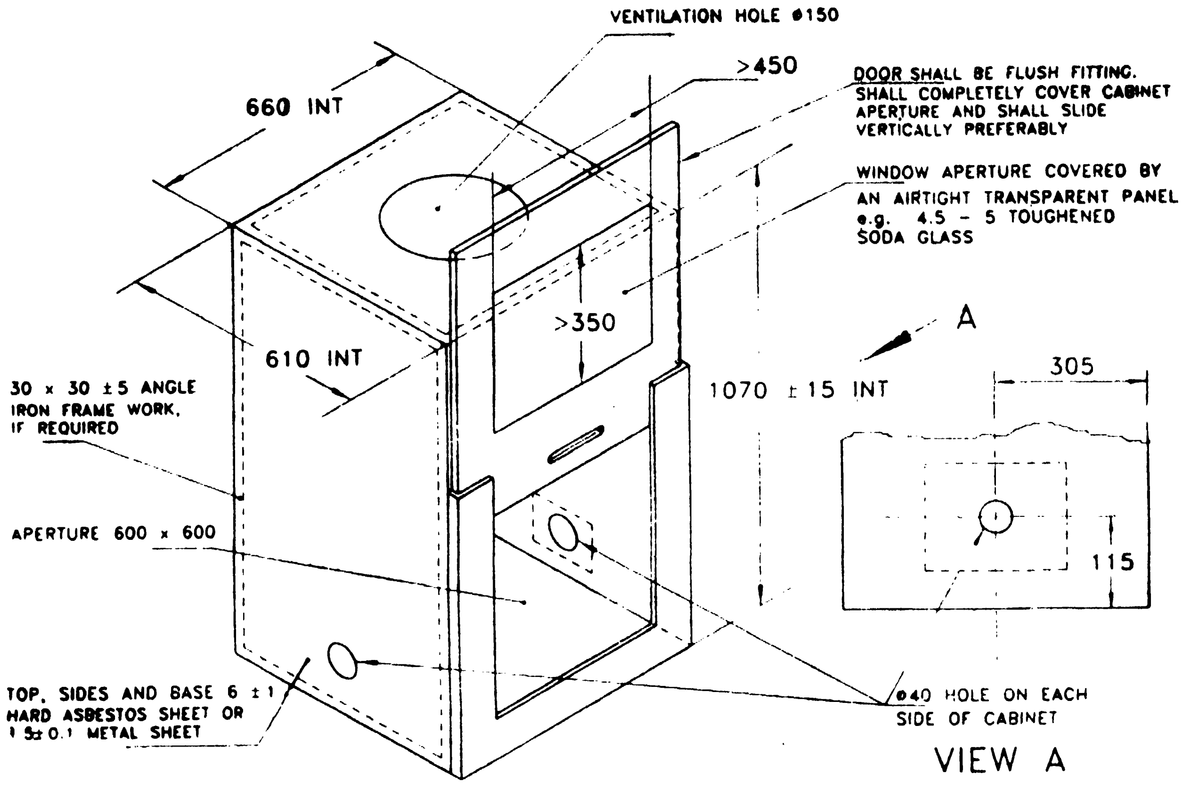
b) A suitable stand with clamp to hold the test piece in the required position.

c) A draught-free cabinet inside which the above stand and burner are placed to carry out the test. The cabinet shall comply with details shown in Fig. 2.



Unless otherwise specified length tolerances ± 0·5
diameter tolerances ± 0·1
All dimensions in millimetres.

Fig. 1 Spirit Burner


VENTILATION HOLE ø150
>450
DOOR SHALL BE FLUSH FITTING. SHALL COMPLETELY COVER CABINET APERTURE AND SHALL SLIDE VERTICALLY PREFERABLY
660 INT
WINDOW APERTURE COVERED BY AN AIRTIGHT TRANSPARENT PANEL e.g. 4.5 - 5 TOUGHENED SODA GLASS
A
>350
610 INT
305
30 x 30 ±5 ANGLE IRON FRAME WORK, IF REQUIRED
1070 ± 15 INT
APERTURE 600 x 600
115
TOP, SIDES AND BASE 6 ± 1 HARD ASBESTOS SHEET OR 1.5 ± 0.1 METAL SHEET
ø40 HOLE ON EACH SIDE OF CABINET
VIEW A

All dimensions in millimetres.

FIG. 2 CABINET FOR FLAME TEST

A-3 TEST CONDITIONS

The test shall be conducted in subdued light in the draught free cabinet shown in Fig. 2.

The Barthel burner shall be supplied with 66 O.P. industrial methylated spirit containing 5 percent of wood naphtha. The mean fuel level shall be approximately 760 mm above the base of the burner. The visible flame shall be maintained at a height of 150 mm. The apparatus shall be arranged as shown in Fig. 3.

The test piece shall be held horizontally in the burner flame with the lower edge of the test piece 50 mm above the top of the burner and with the parallel faces of the V-belt in the vertical plane.

A-4 TEST PROCEDURE

Each test piece shall be held in the burner flame for 30 seconds and the burner flame shall then be withdrawn from the test piece.

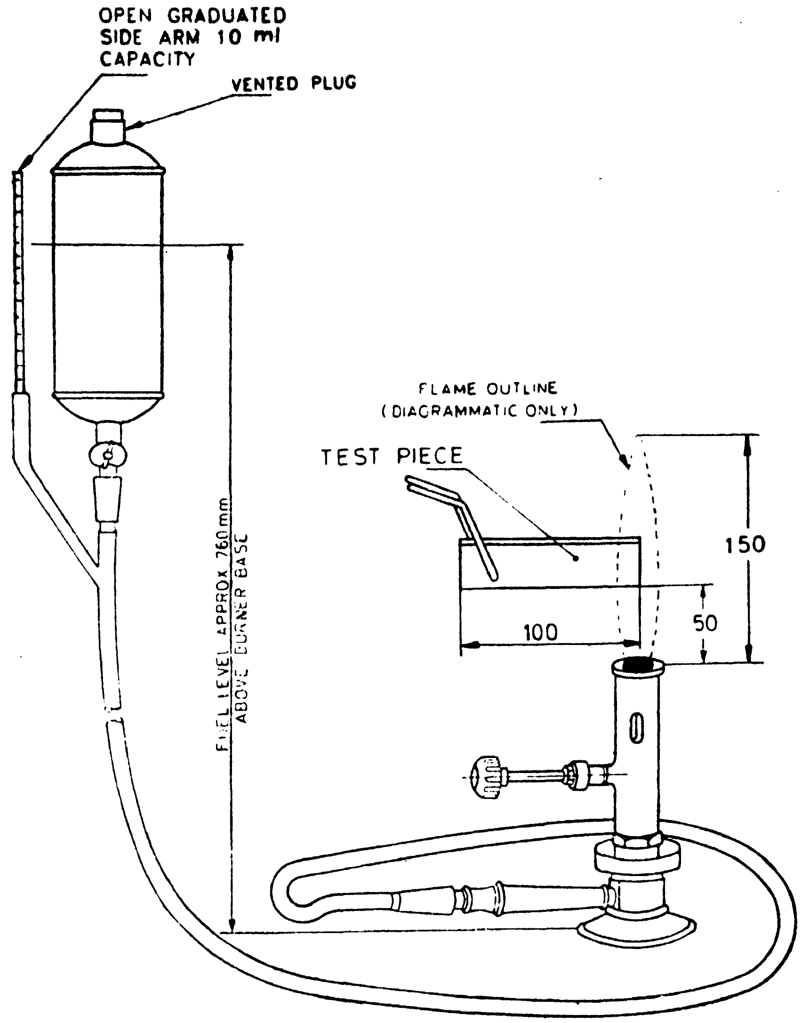
The time between withdrawal of the burner flame and the moment when any flame and/or glow on the test piece extinguishes is recorded.

A-5 EXPRESSION OF TEST RESULTS

A-5.1 Express the test result by:

a) Average extinguishing time for both flame and glow for six test pieces, and

b) Maximum extinguishing time for both flame and glow recorded for any one test piece.


OPEN GRADUATED SIDE ARM 10 ml CAPACITY
VENTED PLUG
FLAME OUTLINE (DIAGRAMMATIC ONLY)
TEST PIECE
150
50
100
FUEL LEVEL APPROX 760 mm ABOVE BURNER BASE

All dimensions in millimetres.

FIG. 3 ARRANGEMENT OF BURNER APPARATUS FOR FLAME TEST

ANNEX B

(*Clause* 7.2)

TEST FOR ELECTRICAL RESISTANCE OF V-BELTS

B-1 TEST PIECES

The tests shall normally be carried out on complete endless V-belts.

B-2 TESTING INSTRUMENTS

The tests shall be carried out with an insulation tester having a nominal open circuit voltage of 500 volts dc or with any suitable instrument known to give comparable results.

In no case shall be voltage applied to the V-belts be less than 40 volts.

The test instrument shall be sufficiently accurate to determine the resistance within 5 percent and shall not dissipate more than 3 watts in the V-belt under test.

B-3 MECHANICAL CONDITIONING

After being strained under the conditions specified for belt pitch length measurement as described in IS 2494 (Part 1) : 1994, the V-belt shall be maintained in the unstrained state at a temperature between 20°C to 30°C for a period of not less than 24 hours.

B-4 PREPARATION AND CLEANING FOR TEST

After mechanical conditioning, the V-belt shall be conditioned for not less than 2 hours at 27 ± 2°C and 65 ± 5 percent relative humidity.

The surfaces which are to be used in the test shall then be cleaned immediately by rubbing with dry fullers earth (B. P. grade) using a clean pad or cotton wool, care being taken to avoid straining the V-belt.

After all traces of the powder have been cleaned away, the surfaces, shall be wiped over with a pad moistened with distilled water and rubbed dry with a clean cloth.

B-5 LIQUID ELECTRODES AND CONTACTS

Liquid electrodes shall be formed on the surfaces of the V-belt by means of a conducting liquid. This shall consist of:

Anhydrous polyethylene glycol of molecular mass 600	800 parts by mass
Distilled water	200 parts by mass
Soft soap (B.P.)	1 part by mass
Potassium chloride	10 parts by mass

The electrode area shall be completely wetted and remain so until the end of the test.

Immediately after the preparation of the V-belt as described in B-4, test liquid coatings shall be applied to two areas of the belt each extending 25 mm along the length of belt and across the full width of the surfaces which make contact with the pulley groove and located so that the dry distance between them is 100 ± 5 mm.

Clean brass contacts, 25 mm wide and constructed with a V-groove having an included angle appropriate to the belt under test, shall be applied to the wetted areas of the belt so that only the driving surfaces of the belt are in contact. At each brass contact a load of 1 N/mm of belt top width shall be applied to the belt to press it into the V-groove to ensure adequate electrical contact (*see* Fig. 4).

The surfaces of the V-belt shall not be deformed during the application of the contacts or during the test.

B-6 TEST PROCEDURE

The V-belt shall be mechanically conditioned and cleaned and then without delay the liquid electrodes and brass contact shall be applied. The V-belt shall then be kept at a temperature of 27 ± 2°C and a relative humidity of 65 ± 5 percent and the resistance test shall be carried out after a period of not less than 15 minutes nor more than 2 hours.

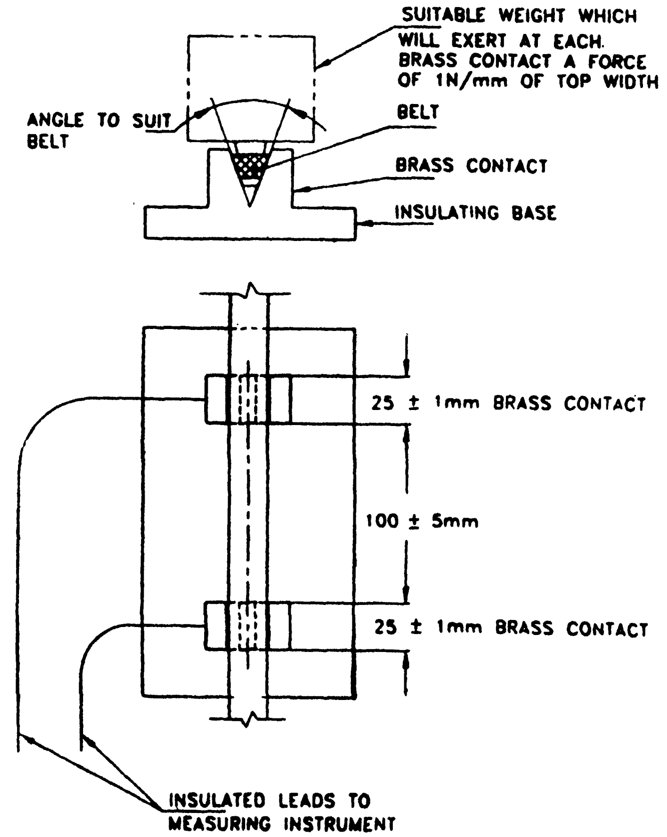

SUITABLE WEIGHT WHICH WILL EXERT AT EACH BRASS CONTACT A FORCE OF 1N/mm OF TOP WIDTH
ANGLE TO SUIT BELT
BELT
BRASS CONTACT
INSULATING BASE
25 ± 1mm BRASS CONTACT
100 ± 5mm
25 ± 1mm BRASS CONTACT
INSULATED LEADS TO MEASURING INSTRUMENT

FIG. 4 APPARATUS FOR MEASURING THE ELECTRICAL RESISTANCE

Connect one of the brass contact to the earth or low voltage terminal of the measuring instrument and the other brass contact to the high voltage terminal.

Measure the resistance in ohms after applying the voltage for at least 1 minute.

Take care not to breathe on the test surface as anycon densation of moisture may falsify the result.

NOTE — The electrical resistance decreases with increase of both temperature and humidity. A successful test therefore proves compliance but an unsuccessful test does not necessarily prove non-compliance which can only be established by retesting at the higher specified limit of temperature and humidity.

B-7 NUMBER OF TESTS

At least five tests shall be made on different portions of the V-belt spaced so that the tests will be representative of the whole belt.

B-8 EXPRESSION OF TEST RESULTS

For each portion of the belt subjected to test, record the electrical resistance in ohms.

B-8.1 Express the test results by:

The maximum electrical resistance measured for any individual test.

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